RESEARCH

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EXTENSION NOTE #20
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Assessing the Effects of Aspen Competition on Lodgepole Pine Growth

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This Extension Note is based on a presentation by Teresa Newsome at the Northern Interior Vegetation Management Association (NIVMA) 1995 annual general meeting in Williams Lake.

Trembling aspen (*Populus tremuloides*) and other hardwoods have traditionally been regarded as weeds and treated as noncommercial species. At best, aspen suckers in young stands have only been retained where they were not inhibiting conifer growth. Aspen, however, has become an economically valuable species in some areas of the British Columbia interior, and requirements for the maintenance and enhancement of biodiversity under the Forest Practices Code are also encouraging forest resource managers to consider natural aspen regeneration as a managed component of a new stand.

While serious competition problems are treated or best avoided altogether, some advantages of retaining aspen and other hardwoods as a component of conifer stands are:

- improved soil properties due to increased decomposition rates
- protection from extreme air temperatures (heat and frost) that can kill or damage conifers
- protection from damaging agents such as the pine terminal weevil (*Pissodes strobi)* and root rot
- greater species and stand structural diversity, which improves biodiversity and wildlife habitat
- improved aesthetics
- protection from browsing by providing an alternative browse source
- ability to capture, store and recycle nutrients on the site
- higher resistance to windthrow damage

COMPETITION INDICES

A competition index is used to predict levels of competition between plant species for making treatment decisions. The decision to treat a stand rests on whether or not a certain threshold of competition has been exceeded. Relative treatment costs are also a factor in the treatment decision.

Many competition indices have been developed by researchers with the intention to produce a simple but reliable indicator of competition levels. In this retrospective study, 11 competition indices were tested using measurements from some natural pine/aspen stands.

RESEARCH Section, Ministry of Forests, Cariboo Forest Region
200 – 640 Borland Street, Williams Lake, BC V2G 4T1 Phone (250)398-4345
Fax (250)398-4380 http://www.for.gov.bc.ca/cariboo/research/research.htm

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Study Methods

Fifty lodgepole pine were selected from three naturally regenerated stands between 9 and 15 years of age in the SBSdw1 subzone. The number of aspen growing around a pine within a 1.8 m radius varied from zero to over 20 stems. Within each 1.8 m radius plot, the following data were collected:

Aspen – height, diameter, distance from the aspen stem to the stem of the pine, distance from the outer crown edge to the stem of the pine, % aspen cover

Pine – height, diameter, crown radius, age and condition

The pine and hardwood variables were plotted together to determine the relationships between pine growth and the hardwood data. The 11 competition indices developed by other researchers were then plotted against the pine variables to determine the degree of correlation.

Results and Discussion

Initial correlations were high between pine basal area and basal area growth and three variables: aspen density, the sum of the pine stem to aspen stem distances, and the sum of the pine stem to aspen crown distances. Aspen density was chosen for further analysis as it showed the clearest relationship and is easily measured operationally.

Conclusions

Pine diameter and diameter growth become significantly reduced at more than 2000 aspen stems/ha compared to pine growing free of competition. Therefore, up to two aspen may be left in a 1.8m radius plot without seriously affecting pine diameter growth.

At more than 5000 aspen stems/ha, pine total height and leader growth were significantly reduced when compared to the largest pine height and leader measurements found at 1000 aspen stems/ha.

Leaving 1000 stems/ha of aspen will not significantly reduce pine diameter growth and may actually increase pine height growth while encouraging self-pruning of the pine through the minor aspen competition.

This retrospective study of 9 to 15-year-old naturally regenerated lodgepole pine stands in the SBSdw1 has yielded some preliminary recommendations. These recommendations should be used with caution, however, as they are based on measurements taken on only a few sites and may be affected by stand age.

Recommendations

If retention of aspen as tall or taller than the pine is prescribed, leave one to two of these aspen within a 1.8m radius from the pine.

To insure optimal pine growth, remove aspen that have diameters equal to or greater than 0.75 times the pine diameter.

Minimize whipping damage by removing any aspen that could potentially abrade the conifers if their crowns were to interact in wind.

Contact

Teresa Newsome
Research Silviculturist
(250) 398-4408
Teresa.Newsome@gems8.gov.bc.ca